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(54) APPARATUS FOR COATING STRIP MATERIAL

(71) We, DEERING MILLIKEN RESEARCH CORPORATION, a Corporation organized and existing under the laws of the State of South Carolina, United States of America, of P.O. Box 1927, Spartanburg, South Carolina, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for coating an edge of a longitudinally moving strip of material.

It is known to provide narrow, relatively stiff bands or strips of fabric to support and reinforce the conventional waist band constructions of garments. Such reinforcing strips are inserted in the waist bands of trousers or skirts beneath the outer fabric layer to provide a relatively stiff lining to resist the tendency for the waist band to roll over or flare out at the upper edge thereof during wear.

Such strips are generally formed from relatively wide width woven fabrics which are slit in the warp direction to provide a multiplicity of the narrow width bands. To be able to perform the desired support function, such fabric bands should be flexible in the warp direction which goes around the waist of the user and fairly stiff in the fill direction. When stiff fill yarns, e.g., nylon monofilament, are cut to form the narrow strips, the yarn ends expose relatively jagged and rough edges at the point of cut. It is desirable that these rough edges be coated with a suitable protective bead of polymeric material to prevent discomfort to the wearer. A method for coating the edges of such stiff, narrow width fabrics with a polymeric coating disclosed in Patent Specification No. 1,264,687.

To further facilitate the resistance to rolling of the waist bands, the stiffening strip may be molded or formed in a transversely bowed shape with a concave surface on one side of the strip and a convex surface on the other side thereof. The reinforcing strip is then sewn into the waist band with the convex surface facing outwardly to further resist the tendency of the waist band to roll outwardly during wear. Such curved reinforcing waist band constructions are disclosed in U.S. Patent Specification No. 3,129,434.

The above described reinforcing fabric strips may be prepared in continuous manner by passing a running length of the narrow strip past suitable bow-shaping and edge-coating stations while heating the strip to facilitate the bow-shaping and edge-coating operations and to cure the polymer-coated edges of the strip. It is therefore desirable during the handling operation to provide suitable means for transporting the strip in bowed form until it is sufficiently set in that condition and to prevent contact of the coated edges of the strip with the guiding and transporting members until the polymer-coated edges have been cured and cooled.

According to the present invention, there is provided apparatus for coating an edge of a longitudinally moving strip of material including means for applying a liquid coating material to an edge portion of the moving strip, means for treating the coating material on the moving strip to form a hardened coating thereon, and means for advancing the strip in a longitudinal direction past the coating means and treating means, wherein there is provided for supporting and guiding the strip during its longitudinal movement at least one guide roller having a central peripheral portion for engaging part of the surface of the strip between the edge portions thereof and recessed portions on each side of the central

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portion to receive the edge portions to prevent their contact with the surface of the guide roller, the roller further including side flanges on said roller spaced from said central portion for engaging the strip to maintain it on the roller during initial threadup of said apparatus, said flanges being spaced a sufficient distance apart to avoid contact with side edges of the strip during movement of the strip thereover.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic perspective view of an apparatus for continuously shaping and coating an indefinite length strip of material;

Figure 2 is an enlarged plan view of the coating section of the apparatus shown in Figure 1;

Figure 3 is an enlarged perspective view of a guide roll for transporting the indefinite length strip of material as shown in the apparatus of Figure 1; and

Figure 4 is a cross-sectional view of the guide roll of Figure 3 taken along line 4-4 of Figure 3.

Referring more specifically to the drawings, Figure 1 shows an apparatus for shaping and coating the edges of an indefinite length strip of cut woven material. As seen, a narrow strip of material 10 is continuously longitudinally drawn from a supply roll 12 by suitable strip advancing means, such as a pair of driven nip rolls 13, past a heating plate 14 and through a shaping section 16. Shaping section 16 includes a convexly curved base plate 18 which may or may not be heated, and a corresponding concavely curved top plate 20 between which the strip of material 10 passes. The strip of woven material 10 is of a thermoplastic nature, e.g., contains nylon fill yarns, such that the heated strip passing through the plates of the shaping section 16 tends to assume the transversely curved shape of the plates 18, 20. The strip 10 may be cooled by passage through the air to retain its curved shape on leaving the shaping section 16 and is guided by a guide roller 24 of the present invention past a pair of applicator rolls 26, 28 which engage the edge portions of the strip and apply a suitable polymeric coating material thereto.

As best seen in Figure 2, the applicator rolls are grooved to receive the rough, cut edges of the strip of material 10, and the lower portions of each roll are submerged in containers 29, 30 of a suitable liquid polymeric coating material such that the rolls transfer the liquid polymer to the edges of the strip 10 to form a protective bead of the polymer thereon. The coating material employed in the present edge-

coating operation may be of various types. The coating material is preferably in a liquid form and may be of the heat curable type such as the various plastisols, or it may be of the hot melt type wherein a heated liquid melt of a suitable polymer is applied to the edges of the strip, cooled to form a hardened coating thereon. Preferably, the coating may be a heat curable polymer, such as a polychloride plastisol. The wet, edge-coated strip 10 passes through a heating tube 32 where the coating is dried on the edges of the strip. After passage through the heater 32, the edges of the strip 10 are again coated with the coating polymer by contact with a second set of applicator rolls 34, 36 to ensure complete cover of the rough cut edges of the strip by the polymer. Thereafter, the edge-coating strip 10, is directed through additional heating means 40 to cure the polymeric coating and through cooling reaches 42, 44, 46 by way of additional guide rollers 47-51 of the present invention.

After being cured and cooled, the edge-coated curved strip of material 10 passes through the advancing rolls 13 and is collected on a collection roll 52.

From the foregoing description, it can be appreciated that it is most desirable to guide the curved edge-coated reinforcing strips through the shaping and coating apparatus without permitting the coated edges of the strip to be contacted by the guiding means, both before curing when the polymeric coating is wet and after curing before the edge coatings have sufficiently cooled to permit collection of the strip without possible deformation or sticking of the coated edges. Additionally, since it is necessary that the movement of the strip through the shaping and coating apparatus be intermittently interrupted to change supply and collection rolls, it is desirable to ensure that the strip of material remains in proper threadup through the apparatus at these times.

To accomplish this, guide rollers 24 and 47-51 are provided.

As best shown in Figures 3 and 4, each guide roller 60 comprises a central peripheral surface portion 62 for supportably engaging and guiding the moving strip of material during its passage thereover, a recess 64, 66 in the peripheral surface of the roller on each side of the central surface portion 62 which extends about the roller for the reception of the edge portions of the strip of material therein. Located outwardly of each recess is a flange 68, 70 for engaging the edges of the strip of material when the material is stopped or is under low tension during its passage through the apparatus to facilitate the re-

tention of the strip on the roller.

By providing a convexly curved central peripheral surface portion on the roller, as shown, the curved strip of material 10 more readily tracks in the center of the roller. Additionally, the retention of the curved shape of the strip 10 is facilitated during the early stages while it is being set by cooling therein. By providing recesses in the roller into which the coated edges of the strip may extend, the edges are prevented from contacting the supporting surfaces of the rollers, thus ensuring proper coating, curing, and cooling of the coated edges without deformation or damage or sticking of the coated edges on the coating apparatus.

Each of the guide rollers may be suitably secured on a rotatable support shaft (not shown) and locked for rotation therewith by suitable means, such as set screw 72.

WHAT WE CLAIM IS:—

25 1. Apparatus for coating an edge of a longitudinally moving strip of material including means for applying a liquid coating material to an edge portion of the moving strip, means for treating the coating material on the moving strip to form a hardened coating thereon, and means for advancing the strip in a longitudinal direction

past the coating means and treating means, wherein there is provided for supporting and guiding the strip during its longitudinal 35 movement at least one guide roller having a central peripheral portion for engaging part of the surface of the strip between the edge portions thereof and recessed portions on each side of the central portion to receive the edge portions to prevent their 40 contact with the surface of the guide roller, the roller further including side flanges on said roller spaced from said central portion for engaging the strip to maintain it on the 45 roller during initial threadup of said apparatus, said flanges being spaced a sufficient distance apart to avoid contact with side edges of the strip during movement of the strip thereover. 50

2. Apparatus as claimed in Claim 1 wherein said central portion of the roller between said recessed portions is convexly curved to facilitate guidance of the strip on the roller. 55

3. Apparatus for coating the edge of a longitudinally moving strip of material, substantially as described with reference to Figures 1 and 2 of the accompanying 60 drawings.

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